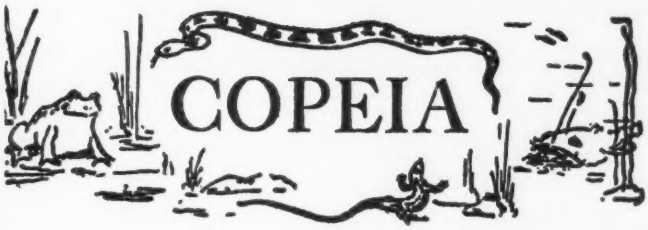

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EELS

In his paper "New Species of Apodal Fishes (Bull. M.C.Z., 1917, 61)", Mr. Alvin Seale writes (p. 79) that a study of the measurements of some specimens in the museum collection "revealed the fact that certain ones, M.C.Z. 9162 from the West Indies and M.C.A. 22,440 (four specimens) from Panama, did not differ in the slightest degree from *Anguilla vulgaris* Turton of Europe".

For some reason Mr. Seale failed to use the M.C.Z. catalogue of fishes, and in this way made a serious misstatement; the "four specimens" are recorded plainly as 22440—22443*, Cadiz. Don Juan di Elizaldar.

Dr. Johan Schmidt's interest in Mr. Seale's statement led to the examination of the specimens in question, and he was good enough to have them X-rayed; his determinations follow:

Anguilla vulgaris. Cadiz.

22440	vert	45 + 68	113
22441	"	44 + 70	114
22442	"	45 + 69	114

Anguilla rostrata (2 specimens). St. Thomas.

9162	vert	43 + 65	108
	"	41 + 66	107

SAMUEL HENSHAW

Museum of Comparative Zoölogy
Cambridge, Mass.

*22442 is not now in the collection.

NOTICE OF HERMAPHRODITISM IN SILVER SALMON, *ONCORHYNCHUS KISUTCH*

Records of hermaphroditism in Salmonidae appear to be very rare. Gemmill[1] cites only two cases and in Dean's Bibliography of Fishes both of these appear with the addition of one more.[2] The writer has no other literature on the subject.

The specimen at hand is a silver salmon, *Oncorhynchus kisutch*, of about three feet in length which was taken by Mr. Winslow, Game Warden of Grays Harbor County, and sent to the College of Fisheries, February 23, 1927. The fish was taken in a trap in the Chehalis river and stripped with other salmon by the county fish culturists. Since it was stripped by incision the membranes within the body were so badly damaged that a detailed study is impossible.

Most of the eggs were removed from the ovaries, but some immature eggs still remain attached to the tissues. The testes are intact, and dorsal to the ovaries. The testes are not fully developed and occupy less than half of the space fully developed gonads would occupy.

Externally the characters are those of a mature female rather than of a mature male. The excessive development of the snout which distinguishes the male is wanting, but the mouth is more distorted than is usually noted in mature females.

D. R. CRAWFORD

College of Fisheries,
University of Washington.

1. Gemmill—Teratology of Fishes, Page 48. Reference to Stewart, C. On hermaphrodite trout (*Salmo fario*): and on a hermaphrodite mackerel (*Scomber scomber*). London, J. Linn. Soc. (Zool.) 24 (69–70-71). *Also* Simpson in Todd's Cylcopaedia of Anatomy and Physiology, London, 183659. 11 p. 697.

2. Couch, J. 1868.1 Irregularities of structure in fishes. Student and Intell. Observ. 1868.1. 328-336.

LEUCISCUS MARGARITA IN UPPER SOUTH CAROLINA

On February 3, 1927, while doing some field work along a little stream inside the city limits of Greenville, I noted a small fish in a spring at the side of the brook. This was secured. On the way down the stream to a marsh where I have been taking *Pseudacris*, *Hyla* and *Rana* I captured another of the same species. Some days later I found yet another, much further down the river valley. It was dead and had evidently been thrown away by some boy. I could not relate this species to any form described from this vicinity by Jordan and Brayton who once worked within the city limits, nor to more distant forms described by Cope; so two specimens were forwarded to the U. S. National Museum for identification. They have been identified by Mr. B. A. Bean as *Leuciscus margarita* (Cope). This apparently extends the range of a species I find listed as "not common".

A. L. PICKENS

Greenville, S. C.

NOTE

In the review of the Giant Mackerel-like fishes, by Jordan & Evermann, one species was accidentally omitted, not being noticed by Günther or any other recent authors. This is *Histiophorus dubius* Bleeker. Ichthyologie de Chine, Ned. Tydschrift van de Dierkunde IV, 151, 1873.

If Bleeker's scant description is correct, the species, *Istiophorus dubius*, should be valid as its coloration is unlike any of the known species of Sail-fishes. According to Mr. Barton A. Bean, it reads as follows:

"Histiophorus dubius Blkr.

"Corpus altitudine 5 1-5 circ. in ejus longitudine cum rostro, 4 circ. in ejus longitudine absque rostro, olivascens. Borsum antice fasciis 3 gracilibus cur-

vatus transversis flavis. Dorsum post anum macula magna rotunda nigra flavo ocellata."

Histiophorus magnioci, described by Jordan & Evermann from Florida, is, no doubt, the young of *Histiophorus volador*.

DAVID STARR JORDON
Leland Stanford Univ., Cal.

ON THE TEMPERATURE–OXYGEN TOLERATION OF BROOK TROUT

In a recent paper, Creaser and Brown (1927) point out that there appears to be little or no correlation between the hydrogen-ion concentration of a stream and its suitability for *Salvelinus fontinalis* Mitchell; or at least that their toleration is very broad. Their paper implies a refutation of the work of Coker (1925) who believed he had found a preference for acid or, at least, neutral waters in the east, not finding the species in water with an alkaline reaction. Although Coker may be correct to the extent that if a choice is possible this species may select water tending to the acid side, Creaser and Brown have shown that brook trout can and do lead successful lives in alkaline waters. These writers seem to have made a clear case and refer the limiting factor controlling the distribution of trout to temperature. Of course it has been recognized for long that trout are "cold water fish", and that there is a relation to the amount of oxygen soluble which varies inversely with temperature. It therefore seems unfortunate that Creaser and Brown take no cognizance of it in their paper for doubtless they recognized this condition, although this cannot be gathered from their text. For this reason I am led to place the following remarks on record.

Their view is naturally acceptable but the following distinction should be made. The increase of temperature appears not to be the limiting factor of

itself but is so indirectly only by virtue of its lowering of the saturation point for oxygen. The presence of a sufficient quantity of oxygen to satisfy the needs of a given number of trout is controlled jointly by the temperature and the local conditions effecting the opportunity for exchange of gases, such as riffles, water falls, shallows, etc. For example *Salvelinus fontinalis* Mitchill and *Salmo irideus* Gibbons (introduced) are common in some of the mountain streams of Ashe County, North Carolina. Here in places the summer temperature reaches at least as high as 80° Far., where the streams meander shallowly but fairly swiftly through cultivated valley bottom fields. The trout are thus subjected to high temperatures in July and August but are well supplied with oxygen and show no distress. The fact that they seek the shade of stream side bushes is referred to other factors, for the temperature and oxygen is imperceptibly if at all different in the various closely adjacent spots in these rapidly moving waters. The reasons for the fishes seeking such shelter is referred to causes such as a negative heliotaxis, the seeking of quieter water generally to be found in such places, a hiding from enemies and the finding of a lurking place from which to prey on smaller fishes. Furthermore, it is not uncommon, under special conditions to find them disporting in the sunlight.

Considerable experience at the New York Aquarium with these species, as well as other Salmonidae; *S. fario* Linnaeus, *S. mykiss* Walbaum, *Cristivomer namay cush* (Walbaum), *Oncorhynchus tschawytscha* (Walbaum) and *Coregonus clupeiformis* (Mitchill) has strengthened this view. Formerly these fishes were kept in a closed circulating system which was refrigerated. After a time they began to show bad effects from it, which the admission of small quantities of new water checked to a limited extent. It is believed that the trouble lay in the accumulation of the dissolved and liquid wastes of the fishes them-

selves eventually reaching their upper limit in the toleration of acidity. Fishes which will not tolerate waters as cold as those inhabited by trout have not such high oxygen requirements and it is thought that under such low temperatures their metabolic rate would be slowed down to an extent sufficient to prevent them from normally completing their life cycle. That all our northern fishes will stand the rigors of our winters is evidence that it is not inimical to their health but merely checks activity, frequently to the point of complete or semi-hibernation. Trout on the other hand are of course not affected this way. A study of the accompanying physiological differences would be interesting. In 1925 a new system was installed in the New York Aquarium in which the water was used at its normal summer temperatures, but was sprayed into the tanks in many small jets so that a thorough aeration was insured[1] as well as a complete circulation within the tank permitting of no "dead pockets". Since then this method has been used with marked success, losses of specimens during the warm period being reduced by more than half, although the water has reached as high as 71° (in the tanks). This is naturally interpreted to mean that despite the temperature, we have been able to dissolve enough oxygen for their needs even at the increased metabolic rate induced by the warmer water. The present views may be expressed by the following tabulation.

1. *Salvelinus* (at least) has a rather wide H-ion tolerance, but is probably more tolerant of high acidity than of high alkalinity.

2. It has a wide temperature tolerance, from freezing to at least 80° Far. High temperature becomes a limiting factor only when other conditions allow it to restrict the solution of oxygen below the

1. This spraying lowered the temperature not more than 1 or 2 degrees, an amount entirely insignificant here.

minimum required by the fish, irrespective of the temperature's absolute value.

3. *Salvelinus* has a high oxygen requirement and as a consequence, it can only survive in well aerated water.

4. Local conditions greatly affect the amount of dissolved oxygen in water of a given temperature and consequently, with temperature, control the limiting factor, oxygen.

These remarks are intended purely in a suggestive nature and at once a host of problems come to mind. For example it would be very illuminating to make a careful quantitive measurement of the dissolved oxygen similar to the hydrogen-ion and temperature measurements made by the writers referred to. These three elements then compared and analyzed might very likely show an interesting and convincing interrelation. It is hoped that some one with the proper facilities might work out such a problem.

Creaser, C. W. and Brown, H. W. 1927. The hydrogen-ion concentration of Brook Trout waters of Northern Lower Michigan. Ecology 8: 98-105.

Coker, R. E. 1925. Observations of hydrogen-ion concentration and of the fishes in waters tributing to Catawba River, North Carolina with supplemental observations in some waters of Cape Cod, Massachusetts. Ecology 6: 52-65.

C. M. Breder, Jr.

New York Aquarium.

THE STATUS OF THE DARTER *RICHIELLA BREVISPINA* (COKER)

In the *Bulletin of the U. S. Bureau of Fisheries* for 1926 (xlii, pp. 105-108), Dr. R. E. Coker has described a supposed new genus of Darters, called *Richia brevispina*, from Paddy's Creek, a tributary of the Catawba River in Burke County, North Carolina—apparently

the same as a form mentioned in 1870 by Cope.[1] Dr. Coker distinguishes his fish from the common and evidently related *Poecilichthys flabellaris* (Rafinesque), of the Mississippi Valley, by the depressed parietal region of the skull, unscaled head and predorsal region, partially scaled belly, and the presence of but 6 or 7 dorsal spines. The colors and general habitus of the fish are extremely similar to those of *P. flabellaris*. More recently, in *Copeia* No. 162 (p. 17), Dr. Coker, finding *Richia* preoccupied, has substituted *Richiella* in its place. In the same number of *Copeia* (p. 18) Prof. Cockerell has described the scales of the fish, finding some very slight differences from those of a much smaller *P. flabellaris* (*cumberlandicus*?) from Cumberland Gap, Tennessee, in his collection.

We have, in the Stanford collections, two small Darters similar to Coker's fish, from John's River, Morganton, Burke County, North Carolina,[2] which we may take to be practically topotypical of *Richiella brevispina*. They agree well with Coker's description excepting in scale count, but it must be remembered that scale number is very variable in *Poecilichthys flabellaris* and that Coker had but three specimens (see footnote 2). Our specimens show respectively D.VI–11, scales 40 and D.VII–12, scales 44. Comparing these with specimens of *flabellaris* from Tennessee and Indiana we find Coker's generic differences rapidly fading. So far as I can find, the head of *flabellaris* is always naked, and the predorsal region is naked to a greater or lesser extent on all my material. In the Burke County specimens the belly is scaled only posteriorly, as Coker describes, but I do not

1. "On some Etheostomine Perch from Tennessee and North Carolina." *Proc. Amer. Philos. Soc.*, xi, 1870, p. 263. *Poecilichthys flabellatus* var. from the Upper Catawba.

2. Reported long ago by Jordan, *Bull. U. S. Fish Comm.*, viii, (1888) 1890, p. 139, as *Etheostoma flabellare*. Jordan obtained this species both at Buck's Creek and Morganton. He remarks that most of the specimens have but seven dorsal spines and that the scales vary from 40 to 50 in six specimens.

find conditions materially different in the Indiana and Tennessee fish. *P. flabellaris* is said to have the dorsal spines usually 8, but some Indiana specimens before me have only 7. The North Carolina ones have 6 or 7. Finally, Coker seems to place great faith in the degree of convexity of the skull, apparently following Jordan and Evermann, but anyone who has attempted the identification of many Darters knows how unreliable this character may be. It is sufficient in this regard to quote Hubbs:

> "—Its insufficiency and unreliability is indicated by the fact that several of the genera placed in one of the alternative groups by the first authors (Jordan and Evermann) were transferred to the other by Forbes and Richardson, and further by the fact that even the latter separation does not hold valid in all cases."[3]

Thus it appears that none of the supposed distinctive characters of the genus *Richiella* are of such importance as in any way to be construed as generic.

The specific status of *Richiella brevispina* must next be examined. The number of dorsal spines is less (6-7) than usually given for *Poecilichthys flabellaris* (8), but out of a batch of thirteen *flabellaris* from Salt Creek, Monroe County, Indiana, eleven have 7 and only two 8 spines. Other characters of fins, scales, etc., seem covered by variation in Indiana material. Coming to body depth we find that the North Carolina specimens average a little deeper—just enough to be noticeable, and the snout seems a trifle less pointed. Further, the dark lines along the scale rows of the upper sides of the western specimens are almost totally absent. Whether this distinction will hold or not is a question. Nearly sixty years ago Cope[4] noted three color varieties of *flabellaris* from southwestern Virginia as follows:

3. "A Check-list of the Fishes of the Great Lakes, etc." *Misc. Publ. Mus. Zool. Univ. Michigan*, 15, 1926, p. 56, footnote 82.

4. "On the Distribution of Fresh-water Fishes in the Allegheny region of Southwestern Virginia." *Journ. Acad. Nat. Sci. Phila.*, 2nd Ser., vi, 1868, p. 213.

"I. Cross-bars more or less indistinct, but the center of each scale with a dark line, forming together numerous longitudinal striae; several large (spcimens) from Walker's Creek.

II. Dark vertical cross-bars; the usual form.

III. A series of quadrate dorsal, and lateral spots connected by numerous brown shades and spots. Body shorter and more elevated. This marked variety seems to pass into the common one in all respects. Most abundant in Sinking Creek; also from Austinville. Specimens all small."

One of our two Morganton, N. C., specimens belongs in group III and is actually a little deeper than the other, which fits group II, but they seem in no way to be more than variations. Group I would seem to answer the description of Mississippi Valley *flabellaris*. Where, then, is one to find a character to define *brevispina?*

The scale differences noted by Prof. Cockerell cannot be considered to be of much weight, for he apparently compared only the scales of a single specimen of a form (*cumberlandicus*) which, on account of the hyaline color of the body and other characters, may actually be a species distinct from *flabellaris*.

Of course much material must be examined in order to pronounce a final decision as to the distinctness of *brevispina*, but from available evidence I am inclined to place it as a very doubtful eastern race of *flabellaris*, *Poecilichthys flabellaris brevispinus* (Coker), possibly related (though by no means certainly) to *P. f. cumberlandicus* (Jordan and Swain).

The error into which Dr. Coker has fallen should point the rashness of describing new forms of North American fishes without adequate comparison of large numbers of specimens and with little reference to literature either before or since Jordan and Evermann's review of 1896-1900, which is in no sense to be taken as a final word in North American Ichthyology. If Dr. Coker had taken the trouble to examine the older papers of Cope and Jordan he would doubtless have perceived more clearly the nature of his

material, and saved both printer's ink and the addition of another useless synonym to the literature.

GEORGE S. MYERS

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California.

RICHIELLA BREVISPINA (COKER) CONSIDERED A SYNONYM OF *CATONOTUS FLABELLARIS HUMERALIS* (GIRARD)

Coker (1926) recently proposed a new genus and species of darter, based on material from the Atlantic drainage of western North Carolina. He gave it there the name of *Richia brevispina*, but later (1927) replaced the preoccupied generic name with *Richiella*. Coker's account has been supplemented by Cockerell (1927), who has compared the scales of *Richiella brevispina* with those of supposedly related genera and species.

On studying Coker's first paper on this darter, I was unable to appreciate any clear-cut characters by which it might be distinguished specifically from the common fan-tail darter, *Catonotus flabellaris* (Rafinesque). In that well-known species, the parietal region is rather depressed and not strongly convex in cross section and the nape and breast and often much of the belly are scaleless. These characters therefore can not be used to distinguish *Richia* (or *Richiella brevispina* from *Catonotus flabellaris*.

The number of dorsal spines seemed to offer a distinction, which however has largely disappeared on an examination of the type material. Both of the paratypes as well as the holotype appear to have seven dorsal spines. *Catonotus flabellaris* has either seven or eight dorsal spines (as Forbes and Richardson have stated); in a series of eight specimens from Big Tonoloway Creek, Maryland, for example, as many specimens have seven as eight spines. It seems prob-

able that other specimens from the type-locality of *brevispina* would show eight spines.

The scale differences mentioned by Cockerell appear to me to have been due to variation in individuals, age, and condition of preservation.

The type-description and type-figures of *brevispina* do not mention or show the black spots and the mottlings of the back—characters of *flabellaris* which are also shown by the types of *brespina*.

It is true that the types of *R. brespina* are more strongly barred and less evidently streaked than are most examples of *Catonotus flabellaris flabellaris*. But examples from Maryland are quite like these from North Carolina. The nominal species *brevispina* in fact may represent an Atlantic drainage race, in color as well as in range standing on the opposite side from that taken by *Catonotus flabellaris lineolatus* of the northwest. The oldest available name for an eastern subspecies (possibly species) would be *Oligocephalus humeralis* Girard (1859), the type of which came from James River, Virginia.

Richia or *Richiella brevispina* should therefore, if my interpretations are valid, be referred to the synonymy of *Catonotus flabellaris* (Rafinesque), and further to the synonymy of an eastern subspecies, *Catonotus flabellaris humeralis* (Girard), if that can be validated.

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CARL L. HUBBS
Museum of Zoölogy,
University of Michigan,
Ann Arbor, Michigan.

ANOTHER FISH TRAP

I was filling an order for five large "jewfish" *Promicross guttatus*, for the New York Aquarium in 1913 (?). With a hired boat I was fishing at the wreck of the old "Shell Island" a few miles up the coast from Key West. We were about out of bait so I was fishing in hopes of landing a "porgy", a favorite bait for jewfish. I pulled up a fish which I instantly recognized as new to me so hurriedly placed it in a "water glass" to observe it, when it threw up a live gobie. The gobie died shortly and I put it in alcohol. Mr. John T. Nichols described it as *Gobiasoma longum*, new species, and the "host" proved to be *Neomaenus ambiguous*, the first recorded in American waters. The *Neomaenus* lived a long time at the Aquarium. I think the occurrence too interesting to let go unrecorded.

Wichita, Kansas. CHAPMAN GRANT

BARBUS AFROVERNAYI, NEW NAME

Mr. G. S. Myers of Stanford University calls our attention to the fact that *Barbus vernayi* Nichols and Boulton, 1927, Amer. Mus. Novit., Number 264, p. 7, fig. 4, Angola, is preoccupied by *Barbus vernayi* Norman, 1925, Ann. Mag. Nat. Hist., (9), XV, p. 315, Siam. We therefore wish to substitute *afrovernayi* for *vernayi* Nichols and Boulton, and in doing so to express the hope that Mr. Vernay may discover for us still other new species of this widely distributed genus of fishes, in out of the way corners of the Old World which it may interest him to visit.

J. T. NICHOLS
R. BOULTON

A LIST OF REPTILES AND AMPHIBIANS FROM THE OKLAHOMA PANHANDLE*

During the months of June and July, 1926, the author was in charge of the University of Oklahoma Museum of Zoölogy Expedition in Western Oklahoma and the Oklahoma panhandle. That part of the State known as the panhandle proved to be extremely interesting faunistically. It is an area of some size, about 170 miles from east to west and about 36 miles from north to south. Since so little herpetological collecting has been done in this region a list of species taken may be of value.

Most of our collecting in the panhandle was done in two places: (1) 8 miles southeast of Guymon, Texas County, and (2) in the very northwest corner of the State, 3 miles north of Kenton, Cimarron County. Unless otherwise stated it is these localities which are meant when the respective counties are listed. Although only about 95 miles apart, these two collecting regions are typical of the two physiographic sections, the former lying in the western part of the Plains border section of the Great Plains Province and the latter in the Raton section of the same province.

1. *Ambystoma tigrinum mavortium* (Baird).
   Cimarron County, 5 miles north of Kenton and 6 miles east of Kenton.
2. *Scaphiopus hammondii* Baird.
   Cimarron County, 7 miles south of Boise City.
3. *Scaphiopus holbrookii holbrookii* (Harlan).
   Cimarron County, 5 miles north of Kenton.
4. *Bufo woodhousii* Girard.
   Cimarron County. Texas County.
5. *Rana pipiens* Schreber.
   Cimarron County. Texas County.

*Contribution from the Zoölogical Laboratory of the University of Oklahoma, Second Series, No. 77.

6. *Rana sphenocephala* (Cope).
   Cimarron County. Texas County.
7. *Crotaphytus collaris collaris* (Say).
   Cimarron County. Texas County.
8. *Holbrookia maculata maculata* (Girard).
   Cimarron County, 7 miles south of Boise City and 3 miles north of Kenton. Texas County, 9 miles southeast of Hooker and 8 miles southeast of Guymon.
9. *Sceloporus undulatus thayerii* (Baird & Girard).
   Texas County.
10. *Sceloporus undulatus tristichus* (Cope).
    Cimarron County.
11. *Phrynosoma cornutum* (Harlan).
    Cimarron County, 7 miles south of Boise City, and 3 miles north of Kenton. Texas County.
12. *Cnemidophorus sexlineatus* (Linnaeus).
    Cimarron County, 7 miles south of Boise City, and 3 miles north of Kenton. Texas County.
13. *Eumeces obsoletus* (Baird and Girard).
    Cimarron County, 8 miles southwest of Boise City.
14. *Heterodon contortrix* (Linnaeus).
    Texas County.
15. *Heterodon nasicus* Baird and Girard.
    Cimarron County, 7 miles south of Boise City and 3 miles north of Kenton. Texas County.
16. *Coluber constrictor flaviventris* (Say).
    Cimarron County.
17. *Masticophis flagellum flavigularis* (Hallowell).
    Cimarron County, 7 miles south of Boise City, and 3 miles north of Kenton. Texas County, 9 miles east of Guymon and 8 miles southeast of Guymon.
18. *Pituophis sayi* (Schlegel).
    Cimarron County, 7 miles south of Boise City, and 3 miles north of Kenton. Texas County.
19. *Lampropeltis getulus holbrooki* (Stejneger).
    Texas County.

20. *Natrix sipedon transversa* (Hallowell).
Cimarron County. Texas County.
21. *Thamnophis marcianus* (Baird and Girard).
Texas County.
22. *Thamnophis ordinoides elegans* (Baird & Girard).
Cimarron County, 4 miles northwest of Kenton.
23. *Thamnophis radix* (Baird and Girard).
Cimarron County, 4 miles northwest of Kenton.
Texas County.
24. *Thamnophis proximus* (Say).
Texas County.
25. *Crotalus confluentus* Say.
Cimarron County, 7 miles south of Boise City, and 3 miles north of Kenton.
Texas County.
26. *Kinosternon flavescens* (Agassiz).
Beaver County, 2 miles east of Gate. Cimarron County, 7 miles south of Boise City, 18 miles east of Kenton and 3 miles north of Kenton.
Texas County.
27. *Chelydra serpentina* (Linnaeus).
Texas County.
28. *Terrapene ornata* (Agassiz).
Cimarron County, 7 miles south of Boise City, and 3 miles north of Kenton. Texas County.
29. *Pseudemys elegans* (Wied).
Beaver County, 2 miles east of Gate.

A. I. ORTENBURGER

Norman, Okla.

THE FENCE LIZARD IN THE HUDSON RIVER VALLEY

The Fence Lizard, *Sceloporus undulatus*, is the characteristic lizard of the Pine Barrens of southern New Jersey. In 1482, De Kay (The Zoölogy of New York, Part III, Reptiles and Amphibians, pp. 31-33) recorded it, on the authority of Dr. Eights, from Fishkill, Dutchess County, New York, and stated

that he later obtained it from Coldspring, Putnam County, New York. Recent records of Fence Lizards found in the Hudson River Valley are extremely few. It is, therefore, of interest to report a new locality where the species occurs.

In September, 1926, Mr. W. Odell of Beacon, New York, sent to the American Museum of Natural History a photograph of a Fence Lizard which he had made in the field at Mt. Beacon. Mr. Odell kindly offered to accompany me to a small section on Breakneck Ridge where he had found the Fence Lizard. This locality, ranging from eight hundred to twelve hundred feet in altitude, is on the extreme southwestern end of the ridge, directly on the Dutchess-Putnam County line. This, incidentally, is about half way between Fishkill and Coldspring, De Kay's two locations. The stone mass of Breakneck Ridge is covered at this point with a thin layer of dirt which mainly supports scrub oak. A few pines and cedars are scattered throughout, while the other bare spots are covered with coarse grass which has, however, been kept fairly short by goats that graze over the side of the mountain. There are many outcroppings of stone, with rocks and boulders scattered here and there, and it was among the latter and in the crevices of the bedrock that the lizards were found. Four adults were seen and taken as they scampered over the bare rock or dodged into the crevices. These were all found on the side of a small ridge that rose to a height of about twelve hundred feet out of a fairly level stretch, forming the first high point at the extreme southwestern end of the ridge. Five newly hatched young were caught further down the mountain among the leaves and grass at the base of a small ledge at about eight hundred feet in altitude. It was only between these two places that Mr. Odell said he had ever found the lizards before and, as was the case then, the larger ones seemed to be found higher up. A small depression cuts this end of the

ridge off from a series of knobs that run towards the central and highest part of the mountain, and Mr. Odell told me that although he had tramped through this latter section several times, he had never seen the lizards there. My time was limited so I did not investigate that section personally nor have I had an opportunity to go further into the matter since.

Seven of the lizards taken were added to the collections of the American Museum of Natural History, having numbers R 31916—31919 and R 31928—31930. Upon investigation, there appears to be no difference between these and the typical *Sceloporus undulatus* from the Pine Barrens, either in scale count or other characteristics.

Perhaps someone may find data that will clear up this rather interesting question of the presence of the Fence Lizard in an apparently unsuited and remote district, and also whether the whole section between Fishkill and Coldspring, as well as possibly larger territory, is favorable to *Sceloporus*.

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THE DIFFERENTIAL CHARACTERS OF *BUFO AMERICANUS* AND *BUFO FOWLERI*

Several papers have appeared from time to time on the distinguishing characters of the two common eastern toads, pointing out errors in the accounts of Miss Dickerson and others, but up to the present no one seems to have attempted a formal definition of the two species. At the suggestion of Dr. G. K. Noble, the writer began collecting notes on the subject while in the Palisades Interstate Park, New York and New Jersey, several years ago. These were supplemented by observations on Long Island, in northern New Jersey, the Jersey Pine Barrens, southeastern North Carolina, and later in Indiana. A fairly workable

definition was built up, based to a considerable extent on characters suggested by Ruthven,[1] modified and added to as seemed best. This has been published in my Synopsis of the Amphibians and Reptiles of Indiana[2] but as that paper may not be generally available, the notes on the toads are here presented separately and in more detail.

Bufo americanus Holbrook. Upper surfaces of hind legs rough with irregular enlarged horny warts; body and head very rugose and warty, becoming more so with age; cranial crests usually very evident; some of the warts on the back always enlarged and horny; dark color-spots of back usually each with one enlarged wart; areolae on undersurface rather coarse, each with a minute horny pustule in the adult; color yellowish or reddish brown to blackish, never pale gray or with a greenish tinge, undersurface spotted; dorsal spots usually more irregularly arranged; rarely entirely brick red above; iris more golden; song a prolonged high-pitched musical trill, heard only in the breeding season, April and early May (at the latitude of New York); usually in hilly, upland, or glaciated country; range in general from Hudson Bay and Labrador south to the 39th parallel, much farther south in the mountains.

Bufo fowleri Garman. Upper surfaces of hind legs with small inconspicuous warts, with rare exceptions; warts on back small, almost never enlarged and horny; cranial crests less conspicuous; several small warts of equal size in each large dark color spot of back; areolae of undersurface very fine, with no tiny horny pustules, the skin soft; light gray to dark dull drab, usually with a slight greenish tinge; dorsal dark color-spots usually in pairs and very conspicuous when ground

1. Occ. Papers Mus. Zoöl. Univ. Michigan, 47, 1917.
2. Proc. Indiana Acad. Sci., 35, (1925) 1926, pp. 277-294.

color is light; colors never tinged with reddish brown[3]; undersurface spotted or immaculate[4]; iris more silvery; song a characteristic harsh trill, decidedly less musical and shorter than that of *americanus*, heard during the breeding season from late April (or more usually May) to July, and occasionally as late as August; more a lowland species than *americanus* though often found in the same localities; range New England and New York south to Georgia, west to Michigan, Indiana, and Missouri, and along the Gulf to central Texas; a smaller and decidedly more dapper and active toad than *americanus*.

The above definitions apply principally to the adults and are but tentative. Some of my findings, notably those in regard to the height of the cranial crests, do not agree with those of Ruthven. *Fowleri* has the crests lower in all I have examined; their arrangement varies greatly. A much more extensive series than has been available to me should be examined and comparisons made between the young and the tadpoles of the two forms. The factors influencing the at times seemingly inexplicable local distribution of the two species should be sought out. Both occur together in the Interstate Park and at least some of the hill region of northern New Jersey. *B. fowleri* alone is found in the New Jersey Pine Barrens, on Long Island, and in the limestone region of southern Indiana. At Wilmington, N. C., *fowleri* occurs with *Bufo terrestris* and the tiny *Bufo quericus*.

3. A peculiar individual was taken in the Palisades Interstate Park having all the structural characters of *fowleri* but with the body entirely bright red above. Dr. J. P. Chapin of the American Museum told me he had seen other such specimens.

4. Of the specimens I have examined only the Long Island ones were wholly immaculate below. Specimens taken breeding in a pond on a vacant lot at Mt. Eden and Inwood Avenues in the heart of the apartment house district of the Bronx, New York City, (where they apparently were making a last stand against the march of civilization), were variously spotted on the chest, as are those from New Jersey, North Carolina, and Indiana.

It is almost certain that *fowleri* and *americanus* occasionally hybridize. A single specimen caught in the Interstate Park was intermediate in its characters and I believe it was a hybrid. The single bright red specimen with the characteristics of *fowleri* mentioned in footnote 3 may possibly have been the result of a cross. Although in the main the breeding times of the two species are separated by one to several weeks in localities where both occur, it would be wholly possible for an early *fowleri* female to mate with a late or unmated male *americanus*. Other observers have reported apparent hybrids and in the present state of our knowledge this seems the best explanation for specimens not definitely referable to one or the other of these really quite distinct species.

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ON THE TYPE LOCALITY OF THE HORNED LIZARD, (*PHRYNOSOMA BREVIROSTRE* GIRARD)

Stejneger and Barbour, (Check List N. Amer. Amph. Rept., 1923), listed the type locality of *Phrynosoma brevirostre* as the "Plains of Kansas and Nebraska". In answer to an inquiry regarding the occurence of this lizard in Kansas, Miss Doris M. Cochran of the United States National Museum wrote in a letter dated January 3, 1927, that "The type specimen of *Phrynosoma brevirostre* is in the National Museum, bearing the catalog number 208. It was collected at Pole Creek, Nebraska, on July 26, 1856, by W. S. Wood. Some others of the same species in the same collection were taken at North Platte, Nebraska, at Salt Lake, Utah, and 250 miles east of Ft. Laramie, Nebraska. It would seem, therefore, that Kansas is

not a state in which the species really occurs." Pratt, (Man. Vert. U.S., 1923), included western Kansas in the range of this lizard, very probably securing his report from the terminology of the type locality.

During the writer's examination of over 150 specimens of Kansas lizards belonging to the genus *Phrynosoma*, a specimen of the species under consideration, kindly loaned by the United States National Museum, was available for comparison. None of these Kansas specimens exhibited the characteristics of *Phrynosoma brevirostre*. There is clearly from the existing data, no evidence that Kansas is in the range of this species. Therefore, the type locality should undoubtedly have read, "The Plains of Nebraska".

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DISTRIBUTIONAL LIST OF THE AMPHIBIANS AND REPTILES OF UTAH*

The following list of amphibians and reptiles is based, in the main, upon collections made by the writers during the past three years. To this collection has been added all the specimens collected by the First Zoological Expedition of the Brigham Young University. The personnel of this expedition consisted of three students in charge of the writer. All the counties north and east of Provo were visited during June and July of 1926 and over 9,000 specimens of the invertebrate and vertebrate life of the region were collected. The herpetological collection upon which this list is based consists of 368 specimens.

1. *Ambystoma tigrinum* (Green).

Localities: Pine Valley Mountains; Zion Nat'l

*Contribution from the Zoölogical Laboratories of the Brigham Young University, Provo, Utah, No. 6.

Park; Virgin City; Mt. Timpanogas, Wasatch Mts.; Lakota, Bear Lake; Emery County.

2. *Scaphiopus hammondi* Baird.
   Localities: St. George; and Zion Nat'l Park.
3. *Bufo boreas boreas* (B. & G.).
   Localities: St. George; Vivian Park, Provo Canyon; Wellsville Canyon; Lakota, Bear Lake.
4. *Bufo woodhousi* Girard.
   Localities: St. George; Pine Valley; Utah Lake shore near mouth of Provo River.
5. *Pseudacris triseriata* (Wied).
   Localities: Provo River near Provo; Salamander Lake; Mt. Timpanogas; Small Lake 7 miles south of Sheep Creek, Uinta Mts.
6. *Hyla arenicolor* Cope.
   Localities: St. George; and Zion Nat'l Park.
7. *Rana catesbeiana* Shaw.
   Locality: Weber River at Riverdale. This species has been introduced.
8. *Rana pipiens* Schreber.
   Localities: St. George; Alton, Kane Co.; Provo; Vivian Park, Provo Canyon; Salt Lake City; Farr West; Ogden; Wellsville Canyon; Logan Canyon; Lakota, Bear Lake; Sheep Creek, 8 miles south of Manila; Dinosaur Quarry, near Jensen; Strawberry River near Duchesne; Heber City; Lynndyl; Fairview.
9. *Rana pretiosa pretiosa* (B. & G.).
   Localities: Provo; and Vivian Park, Provo Canyon.
10. *Coleonyx variegatus* (Baird).
    Locality: St. George.
11. *Crotaphytus collaris baileyi* (Stejneger).
    Localities: St. George; and Oak City (Millard Co.).
12. *Crotaphytus wislizeni* B. & G.
    Localities: St. George; Goshen, Utah Co.
13. *Saurmoalus ater* Duméril.
    Localities: St. George and Santa Clara.

14. *Callisaurus ventralis ventralis* (Hallowell).
Localities: St. George and Santa Clara (Washington Co.).
15. *Uta stansburiana stansburiana* (B. & G.).
Localities: St. George; Zion Nat'l Park; La Verkin; Lynndyl; Provo; Dinosaur Quarry, near Jsen.
16. *Sceloporus elongatus* Stejneger.
Localities: St. George; Zion Nat'l Park; Dinosaur Quarry; Duschesne.
17. *Sceloporus graciosus graciosus* (B. & G.).
Localities: St. George; Zion Nat'l Park; Lynndyl; Provo; Indianola (Sanpete Co.); East shore of Great Salt Lake; Flaming Gorge Green River; Dinosaur Quarry; Duschesne.
18. *Sceloporus magister* Hallowell.
Localities: St. George; Hurricane; Rockville.
19. *Sceloporus occientalis bi-seriatus* (Hallowell).
Locality: St. George.
20. *Phrynosoma douglassi ornatissimum* (Girard).
Localities: Mountain Meadows (Wash. Co.); Salem; Goshen; Oak City; Indianola; Provo.
21. *Phrynosoma platyrhinos* Girard.
Localities: St. George; Oak City.
22. *Heloderma suspectum* Cope.
Localities: St. George; Washington.
23. *Cnemidophorus tessellatus tessellatus* (Say).
Localities: St. George; Zion Nat'l Park; Dinosaur Quarry.
24. *Eumeces skiltonianus* (B. & G.).
Localities: Zion Nat'l Park; New Harmony; Cove Fort.
25. *Charina bottae utahensis* (Van Denburgh).
Locality: Mt. Timpanogas, Wasatch Mts.
26. *Diadophis regalis regalis* (B. & G.).
Locality: Zion Nat'l Park. One specimen of this species is in the Zion National Park Collection. It is through the kindness of the park naturalist, Mr. A. M. Woodbury, that the

writer has had an opportunity to study this species.

27. *Liopeltis vernalis* (Harlan).
    Locality: Aspen Grove, Mt. Timpanogas; Provo Canyon.
28. *Coluber constrictor mormon* (B. & G.).
    Localities: Provo; Vernal; Wellsville Canyon.
29. *Masticophis flagellum piceus* (Cope).
    Locality: St. George (Washington Co.).
30. *Masticophis taeniatus taeniatus* (Hallowell).
    Locality: Zion Nat'l Park.
31. *Pituophis catenifer stejnegeri* Van Denburgh.
    Localities: St. George; Leeds; Silver City (Juab Co.).
32. *Lampropeltis getulus boyli* (B. & G.).
    Localities: St. George and Santa Clara.
33. *Rhinocheilus lecontei* B. &. G.
    Locality: St. George. Only one specimen has been collected. This specimen is now in the collection of the California Academy of Science.
34. *Sonora semiannulata* (B. & G.).
    Locality: St. George.
35. *Thamnophis ordinoides vagrans* (B. & G.).
    Localities: St. George; Zion Nat'l Park; Goshen (Utah Co.); Provo; Pleasant Grove; Aspen Grove, Mt. Timpanogas; Logan Canyon; Wellsville Canyon; Lakota, Bear Lake; Sheep Creek; Duchesne.
36. *Thamnophis sirtalis parietalis* (Say).
    Localities: Provo; Farr West (Weber Co.); Lakota, Bear Lake.
37. *Tantilla nigriceps* Kennicott.
    Locality: St. George.
38. *Crotalus cerastes* Hallowell.
    Localities: St. George and Hurricane (Wash. Co.).
39. *Crotalus oreganus* Holbrook.
    Localities: Diamond Valley (Wash. Co.);

Provo; Fairview (Sanpete Co.); Wellsville Canyon.

40. *Gopherus agassizi* (Cooper).
Locality: St. George and southwest.

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NEW REPTILIAN GENERIC NAMES

In drawing up a list of the generic names of reptiles I find a number of names of fossil genera, in current use, preoccupied by names of living forms.

Lamprosaurus Meyer, 1860, Palaeontographica, **7**, p. 245, pl. 27, fig. 1, (Nothosauridae), is preoccupied by *Lamprosaurus* Hallowell, 1852, Proc. Acad. Nat. Sci. Phila., **1852**, p. 206, (Scincidae). The Nothosaurid genus may be called *Lamprosauroides*, new name, the type species being *Lamprosauroides gopperti* (Meyer).

Limnophis Marsh, 1871, Amer. Jour. Sci., (3) **1**, p. 326, (Boidae), is preoccupied by *Limnophis* Gunther, 1865, Ann. Mag. Nat. Hist., (3) **15**, p. 96, (Colubridae). The Eocene genus may be renamed *Paleoboa*, new name, the type species being *Paleoboa crassa* (Marsh).

Cynosuchus Owen, 1876, Cat. Fossil Rept. S. Africa, p. 21, pl. 16, fig. 1-5, (Cynosuchidae), is preoccupied by *Cynosuchus* Gray, 1862, Ann. Mag. Nat. Hist., (3) **10**, p. 328, (Alligatoridae). The South African fossil form may be called *Cynosaurus*, new name, the typical species being *Cynosaurus suppostus* (Owen), with which is associated the more recently described *Cynosaurus whaitsi* (Haughton). The family name must be changed to Cynosauridae.

Brachysaurus Williston, 1897, Kansas Quart., **6**, p. 95, pl. 8, (Mosasauridae), is preoccupied by *Brachysaurus* Hallowell, 1856, Proc. Acad. Nat. Sci. Phila., **1856**, p. 232, (Iguanidae). The Mosasaurid genus

may be renamed *Ancylocentrum*, new name, in allusion to its principal distinctive character. The typical species is *Ancylocentrum overtoni* (Williston).

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THE BULLFROG IN CUBA

The bullfrog, *Rana catesbeiana* Shaw, has not been previously recorded from Cuba. It is, therefore, of considerable zoögeographic interest that the senior writer should have found the species abundant in two small ponds some fifty kilometers from Havana. Both adult and larval specimens from these ponds have been compared with bullfrogs in the American Museum from various parts of the United States. The adult specimens from Cuba are mottled with brown above as in the case of many specimens from the South.

It would seem probable that the bullfrog had been imported into Cuba, but the evidence available suggests that this may not have been very recently. The question then arises, why has the species not spread widely over the island? The following observations seem to have a definite bearing on the problem.

The bullfrog is found in Cuba only in two ponds near Rincon, a small village, an hour's train ride south of Havana. The larger pond, called La Louisa, has a diameter of only five hundred meters in the dry season, while the smaller is less than half this in size. The country surrounding these ponds is barren and comparatively dry. The ponds are found about a twenty-minute's walk from a leper asylum, and as the only road to them runs through this property, they are practically inaccessible to most people.

The bottom and sides of the ponds are covered with soft mud into which one readily sinks to a depth of two or three feet. The banks are clothed in part with a low growth of grass and other vegetation. A few cows are usually to be seen near the water. In both ponds the bullfrogs are very abundant. During the

daytime there are always hundreds to be seen swimming on the surface or sitting on the muddy banks. At night they are equally abundant and nearly as difficult to approach. They seldom allow one to come nearer than twenty or thirty meters. There are no other frogs in these ponds, not even any tree frogs, *Hyla septentrionalis*, which are so abundant in most Cuban ponds.

During the first week in April, the bullfrogs called very frequently during both day and night. No eggs were found, but thousands of small tadpoles moved about in the shallows. At this same time, four or five large tadpoles nearly ready to metamorphose were caught. Thus, in Cuba, as in America, the bullfrog undergoes a prolonged larval life.

A few of the tadpoles were secured and raised for three weeks by the senior writer. During this period, the tadpoles did not increase in size. In the aquaria they usually remained motionless and were seldom observed to feed.

It is interesting to contrast these habits with those of the tadpole of *Hyla septentrionalis* under the same conditions. The latter is a voracious feeder and will take almost any kind of food, including fruit and bread. *Hyla septentrionalis* runs through its entire larval period in fifteen days, and begins to metamorphose when only fifteen millimeters in head and body length. *Rana catesbeiana* has a larval period extending over more than a year and the tadpole reaches a gigantic size before metamorphosing. Thus, it would seem that the tree frog would be able to breed and raise its progeny in many temporary pools throughout Cuba, while the bullfrog, even though firmly established in certain pools, would be unable to extend its range because of its peculiar physiological and life history requirements.

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